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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/035,773 | 12/21/2001 | George D. Papasouliotis | M-5091-2P US | 4530 |

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| EXAMINER |
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MERCADO, JULIAN A

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| ART UNIT | PAPER NUMBER |
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1745

DATE MAILED: 03/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,773

Applicant(s)

PAPASOULIOTIS ET AL.

Examiner

Julian Mercado

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ed

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

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DETAILED ACTION

Remarks

This application is a CIP of parent application 09/053,554 which is now U.S. Patent 6,395,150 B1.

The examiner notes that U.S. Pat. 5,872,058 to Van Cleemput et al. is precluded from being applied as a basis for a prior art rejection in this Office action in view of applicant's declaration under 37 C.F.R. § 1.132 in the parent application, wherein applicant declared sole inventorship of all the subject matter disclosed in the '058 Patent.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims recite that hydrogen is an inert component. This characterization is indefinite in consideration of hydrogen as a gas easily catching on fire and being highly explosive, e.g. the notoriously known Hindenburgh disaster. Additionally, inert components are generally limited in the art as those among the noble gases helium, neon, argon, krypton, xenon and radon, i.e. Group VIII in the Periodic Table.

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Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 2, 5, 7-16, 19-27 and 30-35 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 4 of U.S. Patent No. 5,872,058 in view of Dobuzinsky et al. (U.S. Pat. 5,563,105).

Claims 1, 2, 7-9, 11-16, 20-24, 26, 27 and 31-35 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 2, 6 and 9-12 of U.S. Patent No. 6,395,150 B1 in view of in view of Dobuzinsky et al. (U.S. Pat. 5,563,105).

The claimed subject matter of the '058 Patent and the '150 Patent will be discussed independently. The teachings of either the '058 Patent or the '150 Patent in view of secondary teachings of the prior art will be discussed in parallel.

The claimed subject matter of the '058 Patent is applied as follows: regarding independent claims 1, 15 and 26 and dependent claims 2, 5, 7-14, 16, 19-25, 27 and 30-35, the '058 Patent recites a process for filling gaps during IC production comprising providing a mixture of silicon-containing, oxygen-containing and inert components such as helium and hydrogen. (see claims 1 and 4) The claimed process further recites depositing a film over said

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gaps by using the gas mixture for simultaneous CVD and sputter etching. (see claim 1)

Hydrogen and helium, which are inert components, are part of the gas mixture. (see claim 4)

The flow rate of the inert components are 0 to 50 sccm which reads on the claimed flow rate of up to 5000 sccm. (see claim 9)

The claimed subject matter of the '150 Patent is applied as follows: regarding independent claims 1, 15 and 26 and dependent claims 2, 7-9, 11-14, 16, 20-24, 27 and 31-35, the '150 Patent recites a process for filling gaps during IC production comprising providing a mixture of silicon-containing, oxygen-containing and one inert component such as helium. (see claim 1) The claimed process further recites depositing a film over said gaps by using the gas mixture for simultaneous CVD and sputter etching. (see claim 1) The flow rate of helium is from 0 to 2000 sccm. (see claim 2) Hydrogen is the one inert component in a second embodiment. (see claim 9)

As to the alleged inventive concept which the examiner recognizes as the use of a fluorine-containing component, while the '058 Patent or the '150 Patent do not recite a fluorine-containing component, Dobuzinsky et al. teaches a fluorine-containing component such as SiF_4 , *inter alia*. (col. 2 line 47-50, col. 3 line 20-28) The skilled artisan would find obvious to modify either the '058 Patent or '150 Patent by employing a fluorine-containing component in order to lower the dielectric constant of the resulting film. (col. 2 line 56-63)

The '058 Patent or the '150 Patent does not recite the uniform plasma to have a plasma density equal to or greater than 5×10^9 electrons per cubic centimeter. However, Dobuzinsky et al. teaches a plasma density of greater than 10^{11} - 10^{12} electrons per cubic centimeter. (col. 2 line

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34-39) The skilled artisan would find obvious to employ the claimed density for reasons such as facilitating a correspondingly uniform deposited film.

Regarding dependent claim 12, the '058 Patent or the '150 Patent does not explicitly recite biasing of the substrate. However, the skilled artisan would find obvious that biasing of the substrate is inherently required during the claimed CVD and sputter etching as recited in claim 1. *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977) and *In re Spada*, 15 USPQ 2d 1655 (Fed. Cir. 1990)

Regarding dependent claims 13, 14, 21, 22, 23, 31 and 32, the examiner notes that applicant discloses the substrate holder as conventional. (see specification, page 10 line 7-12) Additionally, Dobuzinsky et al. teaches a conventional reaction apparatus which also supplies a radio frequency bias (RF) to the electrode. (col. 2 line 11-22) As to the specific power level or frequency bias, absent of unexpected results it is asserted that this is an optimizable parameter for a result-effective variable. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) The power level and frequency of the bias is result-effective in that it directly affects the rate of deposition on the substrate on the electrode.

Regarding dependent claims 2, 19 and 30, the '058 Patent or the '150 Patent does not recite the gas mixture to comprise nitrogen. However, in Dobuzinsky et al. nitrogen in the form of N₂O is part of the gas mixture. (col. 2 line 47-48) The skilled artisan would find obvious to employ nitrogen in recognition of nitrous oxide being an art-recognized equivalent to oxygen or other oxidant gases.

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Claims 3, 4, 6, 17, 18, 28 and 29 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over either the '058 Patent in view of Dobuzinsky as applied to claims 1, 2, 5, 7-16, 19-27 and 30-34 above or the '150 Patent in view of Dobuzinsky et al. as applied to claims 1, 2, 7-9, 11-16, 20-24, 26, 27 and 31-35 above, and further in view of Douglas (U.S. Pat. 4,711,698).

The claimed subject matter of the '058 and '150 Patent are discussed above. The teachings of Dobuzinsky et al. are discussed above.

As to dependent claims 3, 4, 6, 8, 17, 18, 28 and 29, while the '058 Patent or the '150 Patent do not explicitly recite neon, argon, or hydrogen and helium in combination, Douglas teaches that inert gases (which would be inclusive of neon) may be supplied in admixture to a hydrogen/argon gas mixture. (col. 4 line 22-39, col. 6 line 17-22) The skilled artisan would find obvious to employ these gases in the '058 Patent or '150 Patent for reasons such as providing better temperature control or providing for safer handling when explosive gases such as hydrogen are used. (*ib*)

As to the flow rate of helium or fluorine, absent of unexpected results it is asserted that this is an optimizable parameter for a result-effective variable. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) The flow rate of gases introduced into the chamber directly affects the rate of reaction (or dilution thereof) of the resulting mixture of gases.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian Mercado whose telephone number is (571) 272-1289. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in black ink, appearing to be 'Julian', with a large loop at the bottom.

Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700